

DISPOSITION OF PUBLIC COMMENTS
AC 25-30, *Fuel Tank Strength in Emergency Landing Conditions*
Prepared by Todd Martin, ANM-115

| No. | Comment | Requested Change | Disposition |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Commenter: Airbus | | | |
| 1. | Page 3 § 5.a. Fuel tank pressure loads Suggest change for clarity and harmonization with the rest of the paragraph. | Change the sentence as follows: “Figures 1 and 2 of this AC show examples of a fuel tank for an underslung wing configured airplane and a fuel tank within a movable tailplane, respectively, both of which would be considered as being entirely outside of the fuselage contour <u>pressure boundary</u> .” | We agree and have made the recommended change. |
| 2. | Page 8 § 5.e. Landing gear separation We suggest to add “in the absence of a more rational analysis” for the side loads assumption as mentioned in the AMC 25.963(d). | Change the sentence as follows: “Failure of the landing gear due to overload should be considered, assuming the overloads to act in any reasonable combination of vertical and drag loads, in combination with side loads acting both inboard and outboard. <u>In the absence of a more rational analysis, the side loads must be assumed to be up to 20% of the vertical load or 20% of the drag load, whichever is greater.</u> ” | We agree and have made the recommended change. |

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| Commenter: Boeing | | | |
| 1. | <p>Page: 8, Paragraph: 5.e.</p> <p>Our suggestion to add “in absence of a more rational analysis” aligns more closely with the proposed text for §25.721 harmonization. Other rational means have been successfully used in the past to establish the side load component used for gear breakaway analysis and other rational methods may continue to be used.</p> | <p>We recommend revising the text to read as follows:</p> <p>e. Landing gear separation. Complying with § 25.721(a) and § 25.963(d)(5): Failure of the landing gear due to overload should be considered, assuming the overloads to act in any reasonable combination of vertical and drag loads, in combination with side loads acting both inboard and outboard <u>(in absence of a more rational analysis)</u> up to 20% of the vertical load or 20% of the drag load, whichever is greater.</p> | <p>We agree and have changed the final AC as noted in the previous comment.</p> |
| 2. | <p>Page: 8, Paragraph: 5.e.</p> <p>Our suggested change to the final sentence in paragraph 5.e. is intended to clarify the requirement of this section, since it is not possible to determine the trajectory of the landing gear following complete separation from the airplane.</p> | <p>We recommend revising the text to read as follows:</p> <p>e. Landing gear separation. ... It should be shown that, at the time of separation, the fuel tank itself is not ruptured at or near the landing gear attachments. The assessment of secondary impacts of the airframe with the ground following landing gear separation is not required. If the subsequent trajectory of a separated landing gear would likely puncture an adjacent fuel tank, the applicant should take design precautions to minimize the risk of fuel leakage. <u>Consideration must be given to the kinematic motion of the landing gear throughout the breakaway sequence. This consideration is applicable if the attachment linkage could enable the landing gear to</u></p> | <p>We agree that clearer wording is needed. The AC text has been revised as follows:</p> <p>5.5. Landing Gear Separation. ... It should be shown that, at the time of separation, the fuel tank itself is not <u>no fuel tank will be ruptured</u> at or near the landing gear attachments. <u>In addition, it should be shown that a failed landing gear will not impact an adjacent fuel tank, considering the kinematic motion of the landing gear throughout the breakaway sequence.</u> The assessment of secondary impacts of the airframe with the ground following landing gear separation is not required. If the subsequent trajectory of a separated landing gear would likely puncture an adjacent fuel tank, the applicant should take design</p> |

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| | Commenter: Boeing | | |
| | | <u>impact an adjacent fuel tank. For fuel tanks not adjacent to the landing gear, the trajectory of the landing gear, once separated from the aircraft, does not require consideration.</u> | precautions to minimize the risk of fuel leakage. |

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| Commenter: Dassault Aviation | | | |
| 1. | §3.b.: The AC 20-128A is noticed. | A reference to concerned § 25.963(e)(1) should be added in the AC. | Paragraph (e) of § 25.963 addresses fuel tank access covers. A reference to § 25.963 (including paragraph (e)) is already included in the AC. We do not believe any additional reference or guidance for that subparagraph is appropriate. No change. |
| 2. | §5.c.(4): To be homogeneous with basic requirement 25.721(c) and AMC §5.d., it is proposed to replace “For airplanes with wing-mounted engines,...” by “For configurations where the nacelle is likely to come in contact with the ground,” | Replace “For airplanes with wing-mounted engines,...” by “For configurations where the nacelle is likely to come in contact with the ground,” | Since this section paragraph is aimed at the wheels up landing conditions, guidance is provided for wing-mounted engines. This is harmonized with the corresponding AMC paragraph. “Configurations where the nacelle is likely to come in contact with the ground” are addressed a few paragraphs later, also as in the AMC. No change. |
| 3. | §5.e.: To be homogeneous with §5.c.(4) for which the subsequent impact of detached engines on fuel tank is not asked, it is proposed to replace the §5.e. last sentence by: “Trajectory analysis of the landing gear subsequent to the separation is not required.” | Replace the §5.e. last sentence by: “Trajectory analysis of the landing gear subsequent to the separation is not required.” | <p>We believe the applicant may need to evaluate the landing gear trajectory subsequent to separation. Unlike engines, the landing gear may be adjacent to a fuel tank and may impact that tank following separation. The AC text has been revised as follows:</p> <p>5.5. Landing Gear Separation.</p> <p>... It should be shown that, at the time of separation, the fuel tank itself is not <u>no fuel tank will be</u> ruptured at or near the landing gear attachments. <u>In addition, it should be shown that a failed landing gear will not impact an adjacent fuel tank, considering the kinematic motion of the landing gear throughout the breakaway sequence.</u> The assessment of secondary impacts of the airframe with the ground following landing gear separation is not required. If the subsequent trajectory of a separated landing gear would likely puncture an adjacent fuel tank, the applicant should take design precautions to minimize the risk of fuel leakage.</p> |

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| Commenter: ANAC | | | |
| 1. | The focus of NPRM 25-137 is structure, yet we have to be aware of the “system” consequences of this change. New section 25.721(c) would require hazardous quantities of fuel not to be spilled in case of engine separation. | Adequate protection of aircraft fuel system shutoff valve (commands, wiring, etc.) should be addressed per draft AC. | Section 25.994 currently requires that fuel system components be protected in the event of a wheels up landing. The NPRM revises § 25.994 to specifically refer to the wheels up landing conditions specified in § 25.721(b), but the requirement is otherwise unchanged. AC 25.994-1, which is referenced in AC 25-X, currently includes guidance on compliance with § 25.994. We do not believe any change to AC 25.994-1 or additional guidance in AC 25-X is necessary. |
| 2. | In the case of new section 25.963(d), it will be the first time that words related to survivable landing conditions appear in part 25. | <p>For clarification’s sake, it would be useful to stress that survivable crash is not a minor crash and which requirements addresses each of these scenarios (survivable and minor).</p> <p>Qualitative guidance of fuel tank protection could be offered also. Inherent protection of surrounding structure and of a crush zone could also be advised. In this sense, figure 1 of draft AC does not show a crush zone. It is important to notice also that crushing effects are considered only for minor crash as per draft AC.</p> | <p>We consider the phrases “emergency landing” and “minor crash landing” to be synonymous. Section 25.963(d) refers to “survivable emergency landing conditions” and also refers to the conditions in § 25.721(b), which are called “minor crash landing conditions.” Section 25.963(d) also uses the inertia forces defined in § 25.561. Section 25.561 is titled <i>Emergency landing conditions</i>, but also uses the phrase “minor crash landing.” Each section of the rule clearly states the associated conditions to be considered, regardless of the label. The words “otherwise survivable,” which precede “emergency landing conditions” are somewhat unique, but are only intended to emphasize the point that these conditions would be survivable, if not for a fire, and therefore that fire must be prevented.</p> <p>Qualitative guidance: Section 25.963(d) requires that fuel tanks be designed such that they are protected during survivable emergency landing conditions. In addition to this qualitative requirement, the rule specifies quantitative criteria in § 25.963(d)(1) through (d)(5). AC 25-X has been revised to clarify this. In addition, 25-X refers to AC 25-8, <i>Auxiliary Fuel Tanks</i>. This reference has been expanded to indicate that AC 25-8 includes qualitative guidance that can be applied to all fuel tanks.</p> |